

Space Solar Power Concept Technology
Maturation
Technical Interchange Meeting
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Output from Working Group Session: In-Space Transportation

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- The past few years have seen technology development and new technologies emerge which could have an impact on reaching the goals of SSP.
- List the technologies which may have the possibility to achieve the goals of SSP. These technologies must have **revolutionary** potential and address one or more of the following characteristics:
 - Significant mass reduction
 - Dramatically improve efficiency
 - Considerable cost reduction
 - Reliability and longevity improvements
 - Ability to withstand operating environments

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Table 1

List of Revolutionary Technologies:

- 1) High Power Hall Thrusters
- 2) Economical, High performance propellants
- 3) Direct Drive Propulsion Systems

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Table 2

Detailed description and assessment of technologies from Table 1. List the impact to the SSP goals and the other related technologies:

- 1) Hall thruster provide the best combination of Isp and thrust level to deliver SSP components quickly and efficiently
Impact: Reduces SSP Launch Masses by > factor of 2
- 2) Sufficiently Available Propellants (SAP) are required due to large scale of SSP. Several SAPs exist including Krypton.
Impacts: *Reduces in-space propellant costs by > factor of 10
*Reduces direct drive implementation challenges (lower thruster voltage)
- 3) Hall thrusters can be directly powered from solar arrays, eliminating the need for boost voltage conversion (operational Voltages: 200-400V)
Impacts: Reduces propulsion system costs up to 30%
*Reduces Propulsion system mass (minimize power processing)
*Increases Propulsion system efficiency
*Reduce system thermal load (lower radiator mass)

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Table 3

Consensus on the future direction of research and development to solve the challenges of SSP:

Near Term: Demonstrate cost effective Hall propulsion technology for SSP

- *Design/Build/Test highly efficient subscale SAP Hall Thruster (e.g. Krypton)

- *Investigate system/mission advantages of SAP Hall Thrusters

- *Investigate advanced SAP storage technologies

- *Investigate direct drive topology/impacts on the SSP system

Far Term: Demonstrate high power, cost effective Hall Propulsion technology for SSP

- *Design/Build/Test highly efficient, high power, direct drive SAP Hall Propulsion System